Patterns Leading to Formulas

Math Content

Students will explore and describe patterns using words, pictures, tables, NEXT-CURRENT formulas, and direct formulas.

1. Red balls make up a pattern in a game. Each step of the pattern has more red balls than the previous step. The NEXT-CURRENT formula below describes the number of red balls in each step of the pattern.

   NEXT red = CURRENT red + 5

   If the number of red balls in the current step is 8, what is the number of red balls in the next step?

   A. 5

   B. 6

   C. 9

   D. 13

2. The letters B and W are used to describe a pattern of bricks in a wall design. If $W = 7$, which formula results in $B = 18$?

   A. $B = W + 3$

   B. $B = W + 4$

   C. $B = 2(W + 1)$

   D. $B = 2(W + 2)$

3. Which formula describes a different pattern from the rest?

   A. $M = 2L + 3 + L$

   B. $M = 2(L + 2)$

   C. $M = 3L + 3$

   D. $M = 3(L + 1)$

4. The formula $T = 3(P + 1)$ describes a pattern of tiles in a path. What is T when $P = 6$?

5. The pictures below show a pattern of white and gray tiles in paths of different lengths.

   Path 2

   Path 3

   Path 4

   Path 5

   Color the tiles in the Path 6 outline below to show which tiles should be gray.
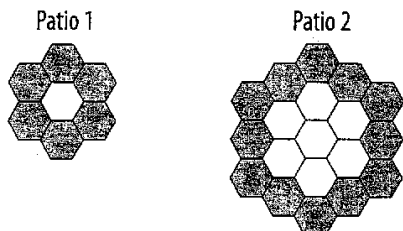
   Path 6

6. Compare and contrast a NEXT-CURRENT formula with a direct formula.

   _____

   _____

   _____

   _____

   _____

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7. Kwan is designing a tile patio. His design uses hexagonal tiles. The design has white tiles in the middle and a gray border. The patio design can be different sizes. Two sizes are shown here.

Patio 1   Patio 2

a. How would the next size patio look if the increases in the white tiles continue? Color the tiles in the Patio 3 outline below to show which tiles should be gray.
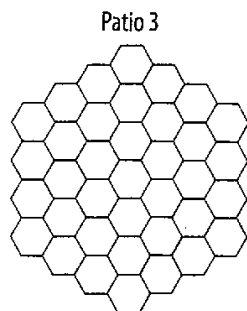
Patio 3

b. Study the patio designs above. Then fill in the table. Look at the patterns to figure out the numbers for Patio 4.

Patio Number (P)	Number of White Tiles (W)	Number of Gray Tiles (G)	Total Number of Tiles (T)
1			
2			
3			
4			61

c. Find a direct formula to calculate the number of gray tiles (G) needed for any patio number (P).

_____

d. Find a NEXT-CURRENT formula to calculate the number of white tiles needed for any patio number (P).

_____

e. Kwan buys a box of 40 gray tiles and a box of 40 white tiles. What is the largest patio he can make with these tiles using this design?

_____

f. How many of each kind of tile will Kwan have left over after he makes the largest patio he can?

_____

_____

Review

8. A sea animal's tentacle is 2 centimeters in a photograph. If the tentacle is 20 centimeters in real life, what is the scale factor of the photograph to the real animal?

A. 0.01

B. 0.1

C. 10

D. 100

9. A man drives a car 318 miles on a 12-gallon tank of gasoline. What is the car's gas mileage?

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